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GB 1504089 A GB 1213763 A

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(54) Video conference system

(57) A video conference system has a master/chairman console 40 which is connected to a plurality of telephone lines 50, 52, each sending and receiving signals from separate individual conference venues. Audio and video signals received on the telephone lines are transmitted to a junction box 42 where they are selectively switched and/or mixed for transmission to separate member consoles 10a, 10b, one for each of the conference participants. Each console may have a lens (16) and a microphone (18), with the conference participants themselves, the chairman, or the participants at the remote venues, being able to control the junction box 42 so as to determine which audio and visual signals are to be transmitted along the telephone lines 50, 52.

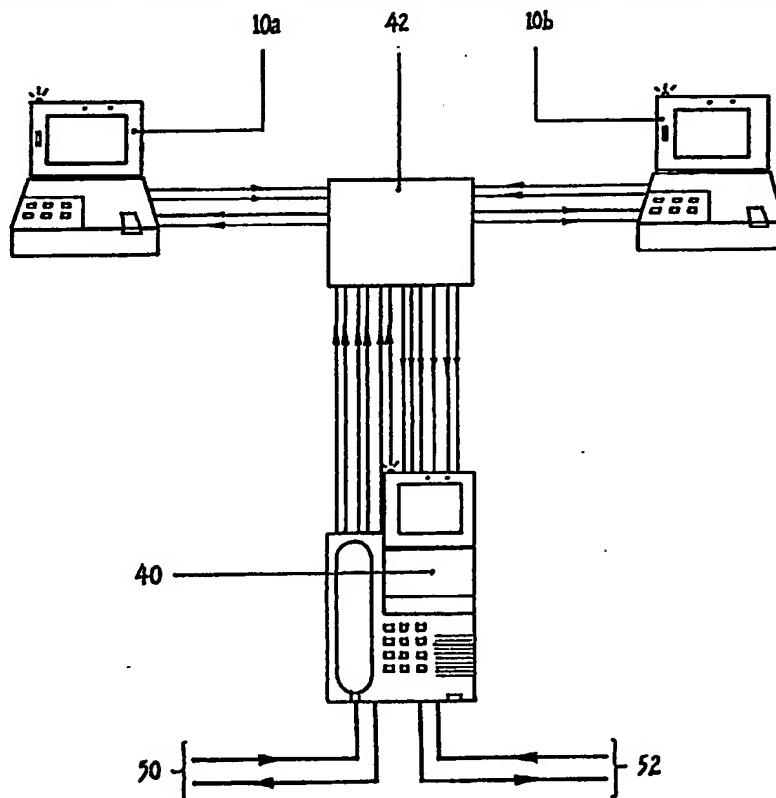


FIGURE 3

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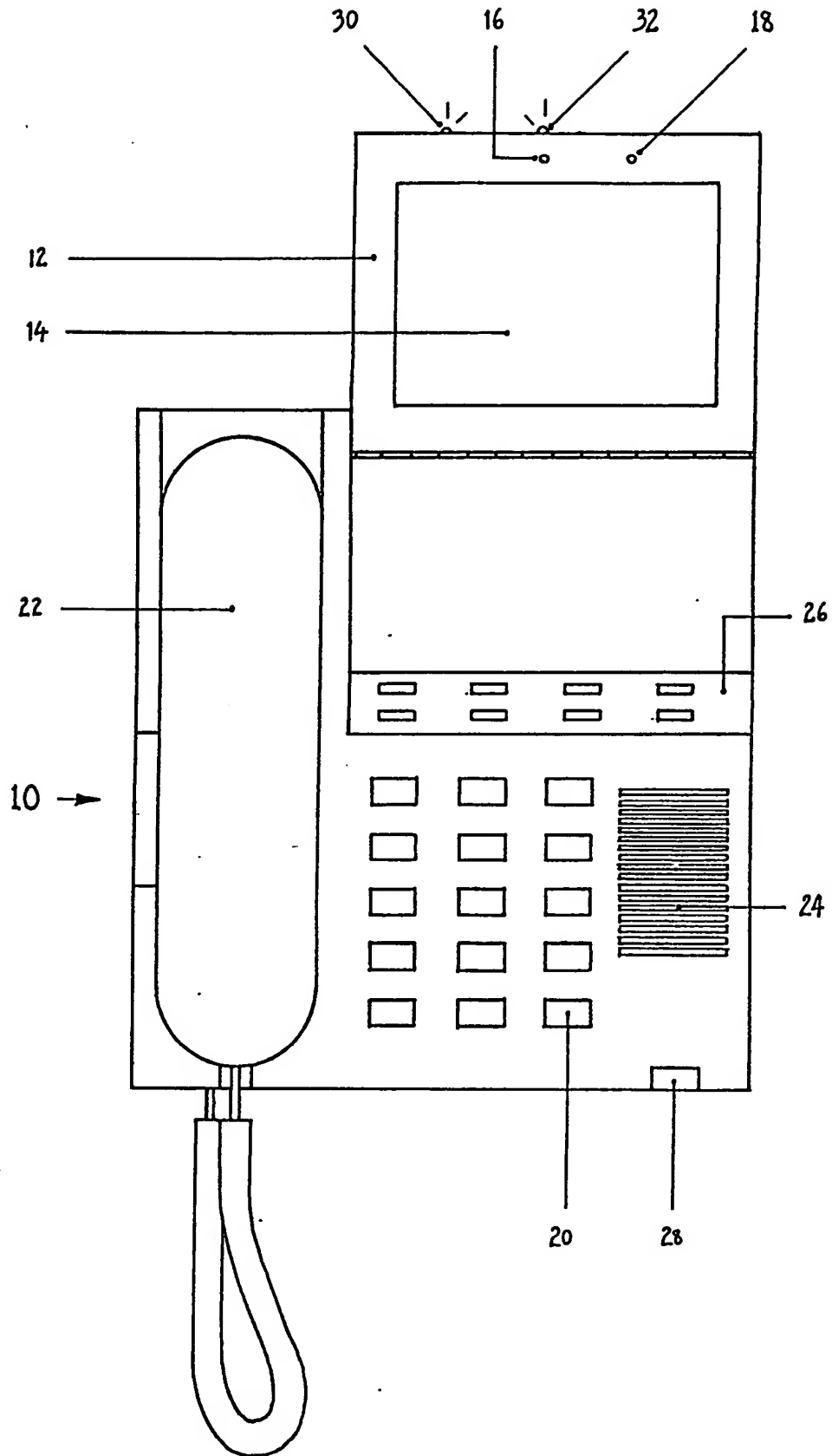


FIGURE 1

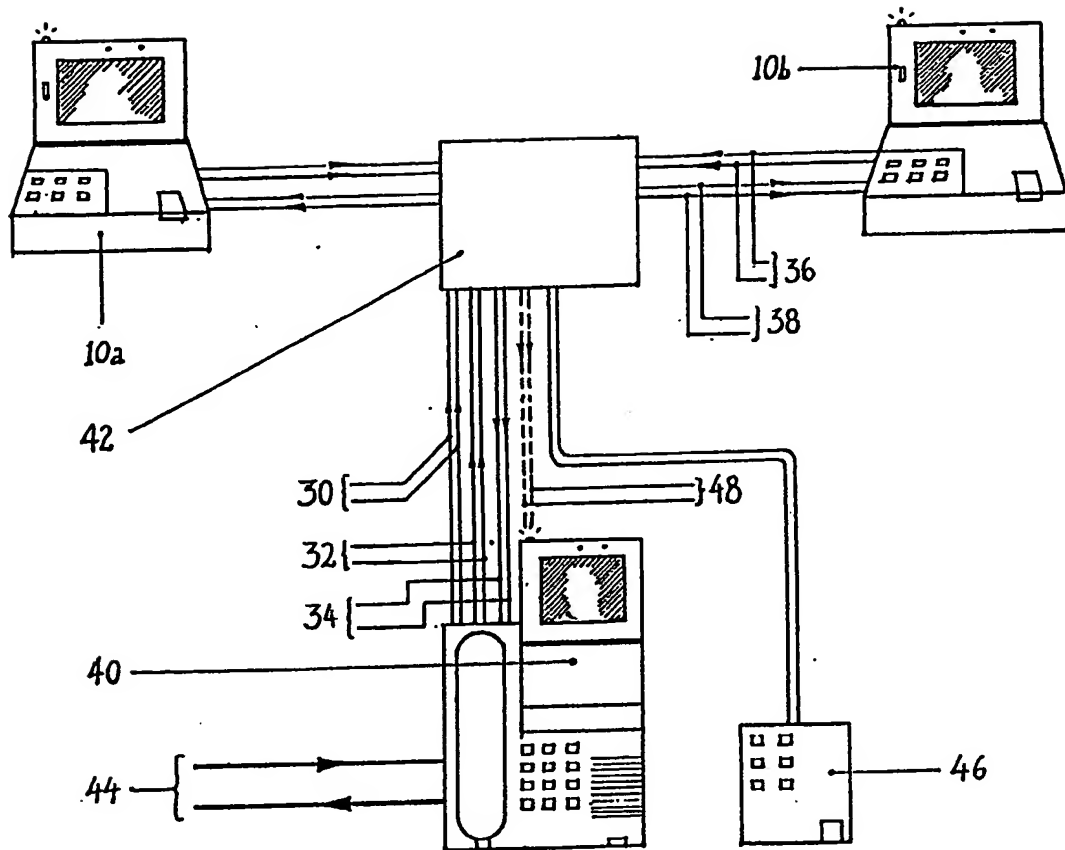


FIGURE 2

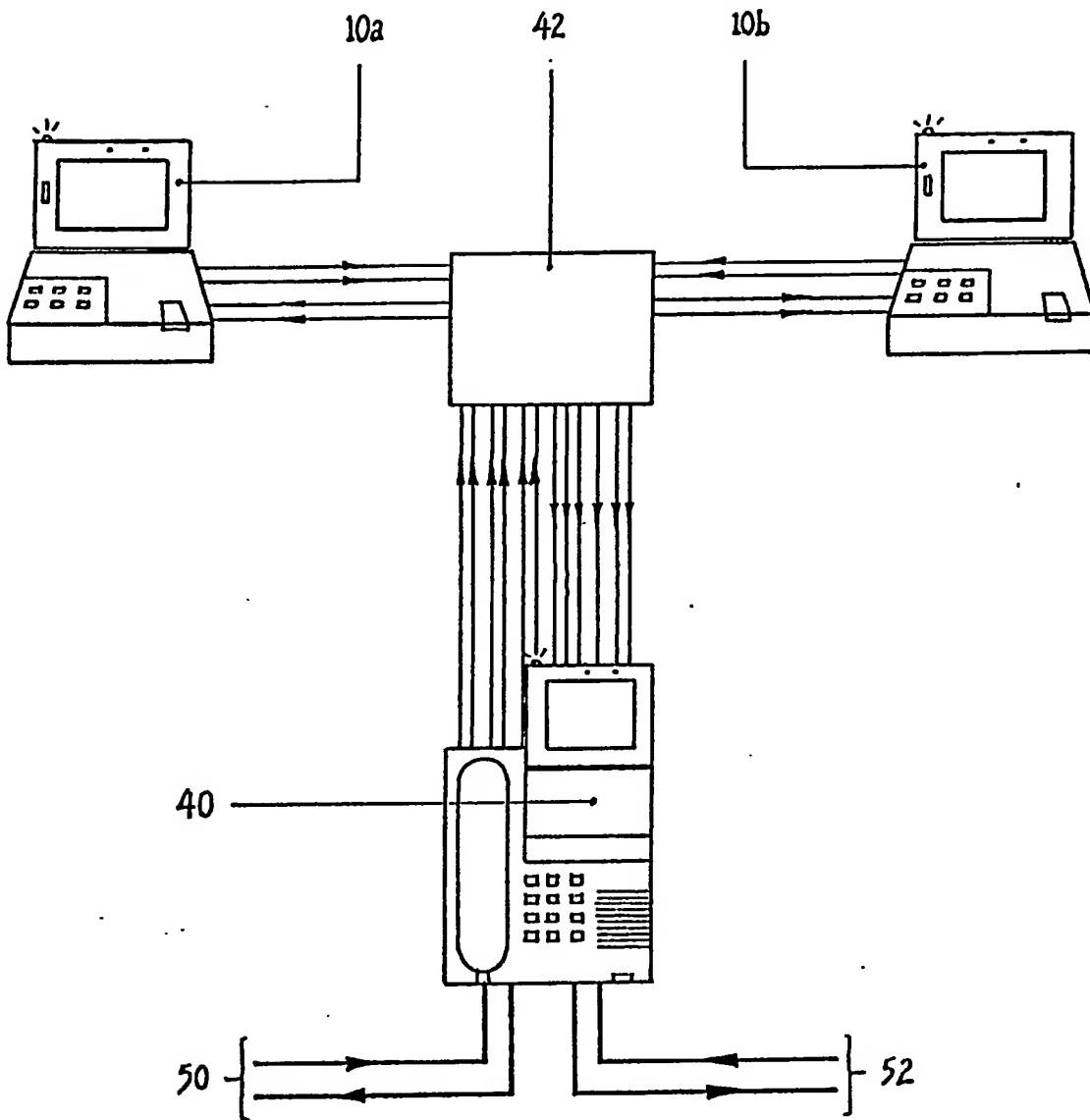


FIGURE 3

VIDEO CONFERENCE SYSTEM

5 The present invention relates to video conference systems.

10 According to the present invention there is provided a video conference system comprising a master console adapted for connection to a telephone line, and a plurality of member consoles, for respective conference participants, each member console being operatively connected to the master console and having a screen and lens means directed in use to view the respective conference participant, the system including a microphone and switching and/or mixing means for selectively displaying on each member console screen an image received via a telephone line, and for selectively encoding images of the participants, and audio signals, for transmission along the telephone line.

20 The optional features will be evident from a description of the preferred embodiment. It is to be understood that the present invention encompasses all of the features herein disclosed, both singly and in any compatible combination.

25 The invention may be carried into practice in a number of ways and several specific embodiments will now be described, by way of example, with reference to the accompanying drawings, in which:

 Figure 1 shows a typical videophone which can be used as the master console in the present invention.

30 Figure 2 is a schematic diagram of a first embodiment of the invention; and

 Figure 3 is a schematic diagram of a second embodiment for a multi-venue conference.

 In the preferred embodiment of the invention, the

system permits telephone conferences in which the participants at each end of the telephone line are able to see the person at the other end speaking on a screen.

Figure 1 shows an exemplary master console comprising a videophone 10 which in use would be positioned on the desk in front of a conference chairman. The console 10, as shown in Figure 1, includes a flip-up lid 12 which carries a screen 14, a lens 16 for a video camera and a microphone 18. The console shown also has a dial pad 20, a handset 22, a speaker 24, a series of video controls 26 (for example for brightness, contrast, self-view and so on), a button 28 for speaking/interrupting the conversation, first and second "on-air" lights 30,32 respectively to indicate when the image from the lens 16 and the sound from the microphone 18 is being transmitted to the other conference participants, and a modem (not shown).

Not all of these features are essential, and in a more basic form (not shown) the master console could simply have a screen 14, a lens 16, some means for dialling 20, and a modem.

Each conference participant will have his or her own individual member console (not shown) which in its most basic form may simply have a screen 14 and a lens 16. Alternatively, each member console could include any one or more of the other master console features, mentioned above.

The master console 10 and each of the member consoles may comprise identical videophone apparatus, for example a suitably adapted videophone of the type sold by British Telecommunications PLC under the brand name Relate 2000. In such a case, not all of the features of the videophones would be required for use as member consoles, and in particular only the modem on the

videophone which is being used as the master console will in general need to be connected to a telephone line. It will be obvious to a skilled man, in the light of the description that follows, how to adapt the mentioned videophone for use in the present invention. Of course, other brands of videophone could also be used.

Figure 2 shows, schematically, the preferred system in its basic form. The video conference system shown comprises a plurality of member consoles 10a, 10b, one for each conference participant, and a master or chairman console 40. The member consoles are connected to the master console via a junction box 42 along with appropriate wiring for transmitting both video and audio signals to the member consoles 38 and receiving both video and audio signals from the member consoles 36. The master console 40 includes a modem, and is arranged for connection to a telephone line 44.

The system would normally be used with the chairman and the other conference participants sitting around one table, each participant having a member console in front of him. Those conference members are then able to communicate, both in pictures and in sound, with other conference members (not shown in the drawing) at the other end of the telephone line 44. At the other end of the telephone line 44 there could either be a single conference member, in which case he would use a videophone such as the one shown in Figure 1, or there may be several conference participants, in which case they would have their own master console and several member consoles attached to that master console.

For the purposes of clarity, no electricity or power cables are shown in Figure 2, nor the wiring by which the consoles control the junction box 42. Although two member consoles are shown, there can of course be any

greater number attached to the junction box, depending upon the junction box's capacity.

5 Attached to the junction box 42 there is a junction box controller 46, which will normally sit next to the master console so that it can be used by the chairman of the meeting. The junction box 42 and the junction box controller 46 are shown as separate units but both could be part of the master console 40. It would also be possible for each individual participant to have his own
10 junction box controller, either separately or as part of his individual member console.

The junction box contains mixing and/or switching means, the electronics for which can easily be designed without further inventive input by a man skilled in the
15 art.

The lens 16 in each of the consoles provides an image of the respective conference participant, and it is the purpose of the junction box to select and/or mix individual images of the participants for transmission
20 down the telephone line 44. Likewise, if the individual consoles contain microphones, the junction box deals with the audio signals, and selects and/or mixes appropriate signals for transmission down the telephone line 44.

Each of the member consoles preferably includes a
25 video camera (not shown) behind the lens 16, which is arranged to send electrical signals to the junction box. In a less preferred, but possibly cheaper arrangement, there is only one video camera contained within the junction box. The image from each lens 16 on the member
30 consoles are transmitted via optical fibres to the junction box, where they are there converted into electrical signals by the video camera for appropriate mixing and/or selection.

In its simplest form, the junction box 42 selects

the image from one of the consoles for transmission down the telephone line 44. The particular image to be transmitted is selected by pressing the talk/interrupt button 28 on each console. When a participant presses the talk/interrupt button 28, the junction box 42 directs that the video image from that console which is received at the junction box 42 along the wires 32,36 is to be transmitted, via the wires 34, to the master console 40 and down the telephone line 44.

As an alternative, the master junction box controller 46 may have controls which enable the chairman sitting at the master console 40 to select the video image from any of the member consoles for transmission down the telephone line 44. The junction box controller 46 may enable the chairman to control the signal going out along the telephone line 44 so that his own voice may be transmitted (via his individual microphone) even though the image being transmitted may be of another conference participant. This feature would be particularly useful at the start of a conference when the chairman introduces to the other side all of the participants on his side: he can then transmit pictures of the participants one by one, while his voice will still be heard.

Another alternative would be for the system to be speech-sensitive. As the microphone 18 on each console received a signal (by the participant speaking) the video image from that console would be selected for transmission.

A yet further alternative is for the image to be selected by the receiver. In such an arrangement, a participant at the remote end of the telephone line 44 (say the chairman) would press a button or otherwise instruct his console (not shown) to display an image of

a particular participant, for example the participant sitting at console 10a in Figure 2. The remote junction box and master console (not shown) would prepare an appropriate signal, to be transmitted down the telephone line 44 where it would be received by the master console 40. The signal would then be passed to the junction box 42 which would select the image of the participant sitting at console 10a for transmission down the telephone line 44.

In a preferred arrangement, the junction box 42 may contain a video image mixer to permit the signal from more than one of the member consoles to be transmitted along the telephone line 44 at once. This will permit, for example, the image of all the participants to be transmitted at the beginning of the conference, by dividing up the transmitted image into regions each given over to the image from one of the consoles 10a, 10b and 40. By necessity, such images will be of poorer resolution than when each image is transmitted by itself. This could be compensated to some degree by transmitting only a portion of the image from each console - for example the central portion of each video image. If video mixing were to be employed, the participants at the remote venue might have the option of choosing to see several of the participants on their screen at once, each image being in a separate "window".

The junction box could be programmed to determine a default image to be transmitted down the telephone line 44, for example if none of the participants of one side of the conference had spoken for some time. That default image could be, for example, the image of the speaker who last spoke, an image of the chairman sitting at the master console 40, or a mixed video image of all the participants. The junction box could be programmed to

send the default image down the telephone line 44, if desired, after a given time delay.

5 The incoming signal received along the telephone line 44 is fed first to the master console 40, and from there it is fed along the wires 30 to the junction box 42 and out to the member consoles along the wires 38. In a standard arrangement, only the video signal need be fed to the consoles, while the audio signal may be fed to a separate speaker (not shown) which all the participants
10 can hear. Alternatively, the audio signal could simply be directed towards the speaker on the master console 40. However, if some of the consoles are located far away from the master console, for example in another room, the audio signal would also be fed to the individual speakers
15 24 on the member consoles.

 Where a common speaker is used for each side of the conference or where the audio signal is fed to the individual speakers 24 on the member consoles, it will be desirable to ensure that only one side can speak at
20 any one time, to prevent audio feed-back. Consequently, it may be necessary to switch off all the microphones on the consoles at one end of the telephone line when there is an incoming audio signal from the other side.

 Instead of or in addition to a microphone on each
25 console, it may be desirable to use a central microphone (not shown), for example positioned in the middle of the table, so that background discussions can also be transmitted. As a further alternative, the audio signal from each of the microphones 18 in the consoles may be
30 mixed and transmitted (subject to possible balancing in favour of the "live" console) while it is only the video signal which is selected for transmission. In such a "balanced" arrangement, the participants at the remote venue would be able to hear all of the participants at

the consoles 10a,10b and 40, but with the sound mixed in such a way as to highlight the speaker who last pressed his talk/interrupt button 28. Mixing of the audio signals (and balancing if required) is carried out in the junction box 42.

If the member consoles are not in the same room as the master console, it will be necessary for the audio signal from each of the member consoles to be fed, via the junction box, to each of the other member consoles as well as transmitted down the telephone line 44. Similarly, the member consoles could display a split screen of the chairman or any other participant at a member console and the video image received from the remote venue along the telephone line 44.

In the case where the member consoles are not in the same room and each console is operated using a built in microphone 18 and speaker 24, care has to be taken to avoid feed-back effects. This could be achieved by arranging for the junction box to disable (or "shunt") the speaker 24 of a particular console when the microphone 18 of that particular console is "live". At the same time the microphones 18 on the other member consoles may need to be disabled while their speakers 24 broadcast the audio signal from the "live" console.

One difficulty associated with normal (audio) telephone conferences is that a central microphone must pick up the voices of all of the participants - some of whom may be several metres away. With microphones 18 built into each of the individual consoles, the quality of sound can be much higher. The amount of background noise and the hollowness of sound often associated with audio telephone conferences will be largely eliminated, especially if the microphones were very directional. This could of course easily be achieved with the proposed

set up, since the microphones could be made if necessary as directional as the individual lenses 16.

Both the audio and the video received signals may need to be amplified for the participants' consoles.

5 This could be carried out either in the chairman's console, the junction box or the individual member consoles.

Each console may include an "on air" light 30, indicating to the participant and to the other
10 participants if they are in the same room that his image is being transmitted along the telephone line; and a separate "on air" light indicating that his voice is being transmitted and/or that his microphone 18 is live.

Although the member consoles are desirably connected
15 to the junction box 42 by appropriate wiring, it would also be possible for a wireless system to be used, for example by way of radio frequency or microwave links. Alternatively, the member consoles and/or the master console could all be built into a single conference
20 table, with the wires (if any) hidden beneath it.

As will be seen from the dotted lines 48 in Figure 2, it is proposed that incoming video and audio signals on the telephone line 44 should be transmitted to the junction box 42 before being re-routed back to the master
25 console 40 to actuate the master console screen and the master console speaker. Although such routing is not absolutely necessary, it may have some advantages for multi-venue conferences, as will be described below with reference to Figure 3.

30 Figure 3 shows, schematically, a further embodiment of the present invention for multi-venue conferences. As before, a master console 40 is connected to member consoles 10a,10b via a junction box 42. The master console 40 in this case however contains two modems (not

shown) enabling it to communicate with two separate telephone lines 50,52. Of course, additional modems and telephone lines could be envisaged. Ideally, the additional modems would be part of the master console 40, but where each of the member consoles consists of a videophone in its own right, it would be possible to use the modems from the individual videophones to connect to the various telephone lines that are required.

The multi-venue arrangement shown in Figure 3 might work as follows in a particular example. A chairman in London telephones Paris and New York on two separate telephone lines attached to his master console 40. The incoming video signal from Paris along the line 50 is mixed in the junction box 42 with the outgoing London video signal (say by a split screen) and the mixed video signal together with the audio signal is then fed to New York along the telephone line 52. Likewise, the incoming video signal from New York along the telephone line 52 is mixed with the outgoing London video signal and together with the audio signal is then fed to Paris along the telephone line 50. The two incoming video signals from Paris and New York are mixed and fed into the London consoles. In this way, each participant has a split screen image of the participants in the other two venues, although the participants in London, if they wished, could each have two screens and have two full size pictures of the participants in Paris and New York.

As an alternative to video mixing and split screen effects, each participant in each venue could have two screens. This could be achieved by removing each alternative refresh of the screen from Paris and New York, and sending the video images alternately to the other venues (alternating with the outgoing video image from London), each participant would have a full size

picture of participants in the other two venues. However, with such an arrangement the pictures in Paris and New York would have only half the refresh rate of the images in London. A decoder and multiplexer would be
5 required to send the images to the correct screens in Paris and New York.

In the above example, in either configuration, the audio signals would be dealt with in the manner of a normal multi-venue (audio) telephone conference but with
10 the refinements related to member consoles which have both microphones and speakers as previously described.

It would also be possible, with multi-venue conferences, to use split screen effects and alternate refreshes of the screen at the same time. For example if
15 there were five venues, with four signals coming in along four separate telephone lines, one could use two screens for each participant, each screen being split into two and showing two images.

With the proposed multi-venue arrangement, only one
20 venue is connected by telephone lines to each of the other "satellite" venues. The satellite venues are not directly connected to one another. The master consoles at each of the satellite venues have only one line coming in each, along which all information is fed. That
25 information is then spread out, at each satellite venue, via a similar junction box and member consoles to that shown in Figure 2. For a conference with n venues, $(n-1)$ telephone lines would be used. This is of course considerably fewer than an arrangement in which each
30 venue is connected to each other, which requires $n(n-1)/2$ telephone lines.

CLAIMS:

1. A video conference system comprising a master
5 console adapted for connection to a telephone line, and
a plurality of member consoles, for respective conference
participants, each member console being operatively
connected to the master console and having a screen and
lens means directed in use to view the respective
10 conference participant, the system including a microphone
and switching and/or mixing means for selectively
displaying on each member console screen an image
received via a telephone line, and for selectively
encoding images of the participants, and audio signals,
15 for transmission along the telephone line.
2. A system as claimed in Claim 1 in which the
switching and/or mixing means is a junction box which is
separate from the master console.
20
3. A system as claimed in Claim 1 or Claim 2 in which
each member console has a talk/interrupt button, the
switching and/or mixing means being arranged to display
on the member consoles and/or to send along the telephone
25 line an image of the participant who last pressed his
talk/interrupt button.
4. A system as claimed in Claim 1 or Claim 2 in which
the switching and/or mixing means is arranged to display
30 on the member consoles, and/or to send along the
telephone line, an image of the participant who is
speaking or who last spoke.
5. A system as claimed in any one of the preceding

claims in which each member console has display selection means, the display selection means being arranged to control the switching and/or mixing means whereby an individual participant can select the image of any other participant for displaying on his respective member console.

6. A system as claimed in any one of the preceding claims including switching and/or mixing transmission-override means whereby a chairman of the conference can select an image of any of the participants for transmission along the telephone line.

7. A system as claimed in any one of the preceding claims in which the lens means on each member console includes a video camera.

8. A system as claimed in any one of the preceding claims including a microphone on each member console.

9. A system as claimed in Claim 8 in which each member console has a microphone on-air light indicating that the microphone is live.

10. A system as claimed in any one of the preceding claims in which each member console has a loudspeaker, and disabling means arranged to disable the loudspeaker when the microphone is live.

11. A system as claimed in any one of the preceding claims in which each member console has a video on-air light, indicating when an image of the respective participant is being transmitted to the other member consoles and/or along the telephone line.

12. A system as claimed in any one of the preceding claims in which the master console is arranged for connection to a plurality of telephone lines.

5 13. A system as claimed in any one of the preceding claims in which at least one of the member consoles is adapted for connection to a telephone line.

10 14. A system as claimed in any one of the preceding claims in which the master console and the member consoles are all videophones.

15 15. A system as claimed in any one of the preceding claims including a further master console adapted for connection to a remote end of the said telephone line, and a further plurality of member consoles, each operatively connected to the said further master console.

20 16. A system as claimed in Claim 15 including switching and/or mixing receiving-override means whereby a participant of the conference can select an image of a person sitting at any one of the further plurality of member consoles, or the further master console, for transmission along the telephone line to his master console and/or the member consoles.

25

17. A video conference system substantially as specifically described with reference to Figure 2; or with reference to Figure 3.

30

Patents Act 1977
Examiner's report to the Comptroller under
Section 17 (The Search Report)

15. Application number

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Relevant Technical fields

(i) UK Cl (Edition L) H4K (KOD3, KFA)

(ii) Int Cl (Edition⁵) H04M, H04N

Databases (see over)

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI

Search Examiner

MR S J L REES

Date of Search

18 JUNE 1993

Documents considered relevant following a search in respect of claims 1-17

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 1504089 A (POIRIER) WHOLE DOCUMENT ESPECIALLY PAGE 1 LINE 69 TO PAGE 2 LINE 9	1, 2, 4, 8, 13, 14 15
X	GB 1213763 A (TOKYO) WHOLE DOCUMENT	1-4, 8, 13

Category	Identity of document and relevant passages 16	Relevant to cla ^s 's)

Categories of documents

X: Document indicating lack of novelty or of inventive step.

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A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

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